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Signaling Gateway - Enabling Convergence of Wireline, Wireless and Data Networks

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The proliferation of the Internet, Intranet, and mobile technology is significantly changing the communications paradigm. Thanks to the growth in Internet traffic and computer power, IP (Internet Protocol) has now become the defacto transport method for next generation telecommunications. The end-user demand for content is bringing wireless and IP technology closer together.

The integration of networks and services has to be achieved with the same quality of service that users have come to expect from today's wireline public service telephone network (PSTN). This means interoperability with existing networks, ubiquitous call completion, carrier-grade reliability and serviceability, integrated billing and customer care, and transparency of services such as free phone calls, premium rate calls, calling card, and voice-messaging.

Today's wireless and wireline networks are based on a interoperable signaling standard known as common channel signaling #7 (CCS#7), providing call set up and tear down information and the network intelligence for the delivery of value-added services such as roaming, free phone, and number portability. Various standards such as GSM, IS-41, ISUP, and TCAP are components of the CCS#7 protocol suite. Currently, the CCS#7 network uses dedicated time division multiplex (TDM) networks for signaling transport. New signaling standards such as H.323, SIP, MGCP, IETF Megaco are being developed for IP telephony operating on IP transport networks. The next generation signaling infrastructure must be able to seamlessly carry CCS#7 and other IP telephony protocols over legacy TDM networks and packet networks. The legacy CCS#7 network elements must be able to communicate with IP-based network elements to insure seamless call control and services.

The architecture of a converged network is illustrated in Fig. 1. The integrated access gateways, trunk gateways, and residential gateways provide the bearer path for the multi-media traffic and are commonly known as media

gateways (MGs). Located at the edge of the network or at the customer premises, MGs support various accesses such as xDSL, cable, 3G wireless, or dial-access through PSTN lines. The **DaVinci VoX**, a media gateway controller (MGC), provides call control and device control function. IETF Megaco working group and ITU SG16 are developing a standard based on the media gateway control protocol (MGCP), the protocol currently employed in the DaVinci VoX MGC. The **DaVinci Service Control Point (SCP)** provides the network intelligence required for prepaid validation, calling name delivery, freephone, and CTI applications.

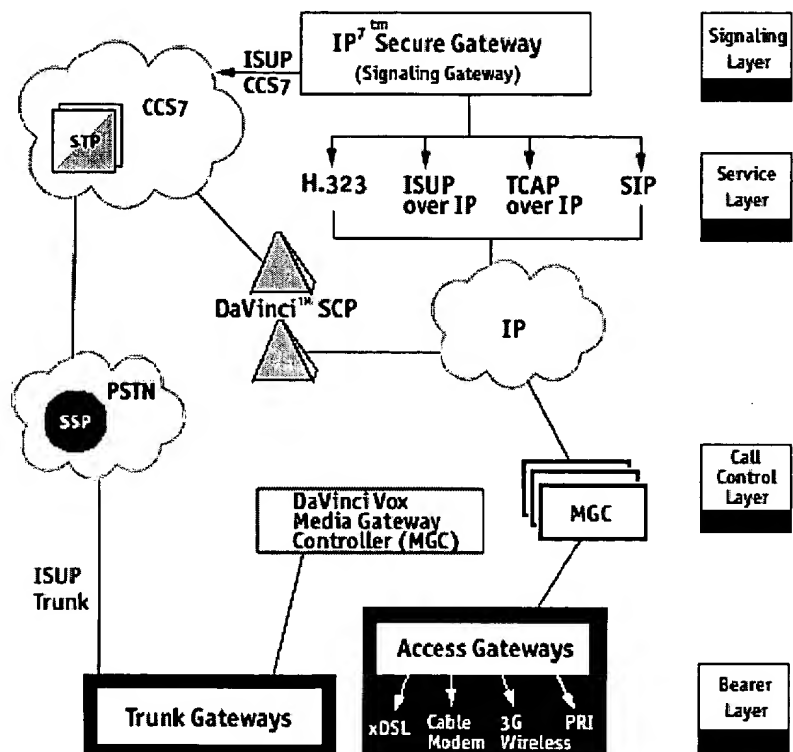


Figure 1. The architecture of a converged network

The Signaling gateway (SG) is a critical element required to bridge networks that speak different protocol languages. The **IP⁷ Secure Gateway**, for example, bridges the ISUP and TCAP protocols between the CCS#7 and IP networks, using the transport adaptation layer interface (**TALI**) which is currently submitted to the Internet Engineering Task Force (IETF). The SG can also bridge various new IP telephony protocols such as ISUP-extensions, SIP, and H.323. Signaling gateways are located at the border of the network and therefore provide internet-network routing services.

The convergence of mobile, fixed and data networks

challenges vendors and service providers to address several issues, including providing a scalable directory server architecture capable of handling look-ups, at an unprecedented translation per second (TPS) rate. Consider an address translation from a global directory number to a gateway location IP address. This requires directory servers to handle a large volume of address translations per second. Employing massive parallel processing and in-memory database technology, Tekelec has developed a high capacity directory lookup engine in the IP⁷ Secure Gateway which can provide look ups in the range of 50,000 TPS.

The signaling is a critical component of any next generation networks. A right signaling network architecture could enable the operators for efficient deployment of new revenue generating services.

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